USPTO
FEB 08 2007
PATENT & TRADEMARK OFFICE

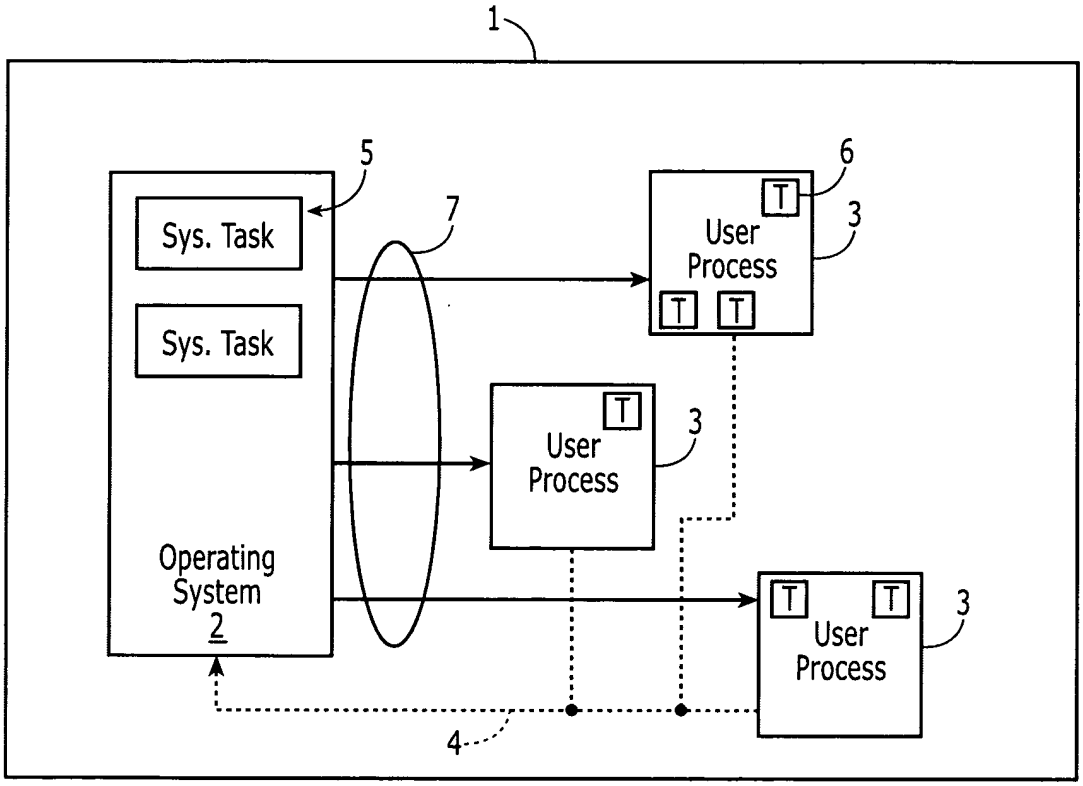


Figure 1
(PRIOR ART)

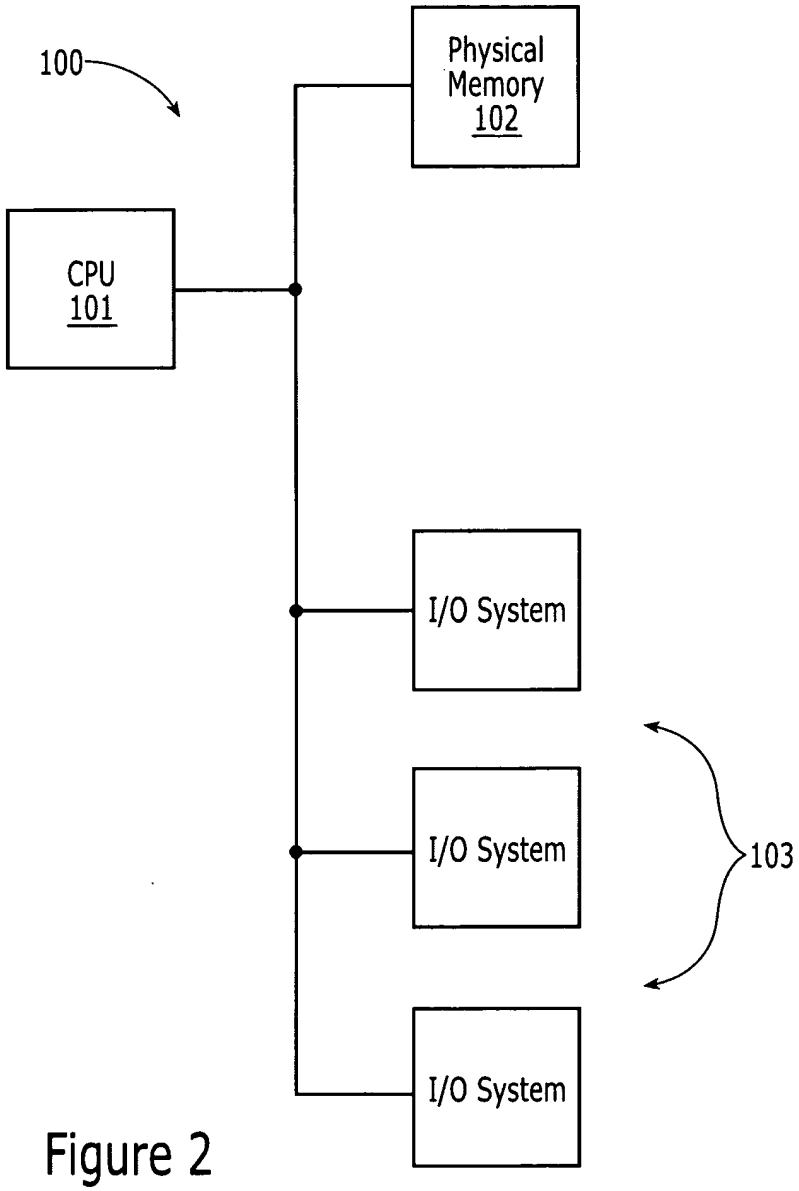

100
Physical Memory 102
CPU 101
I/O System
I/O System
I/O System
103

Figure 2

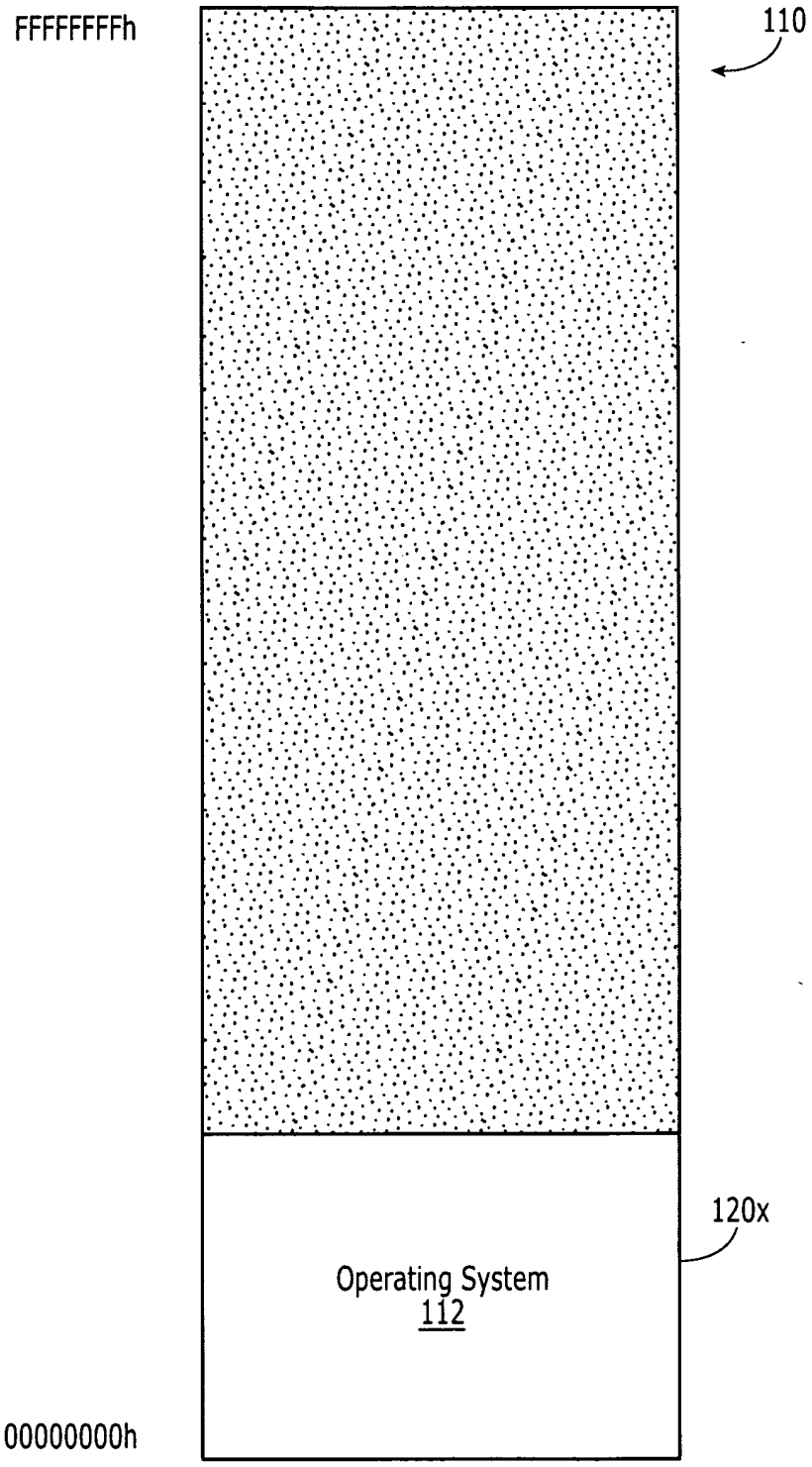


Figure 3

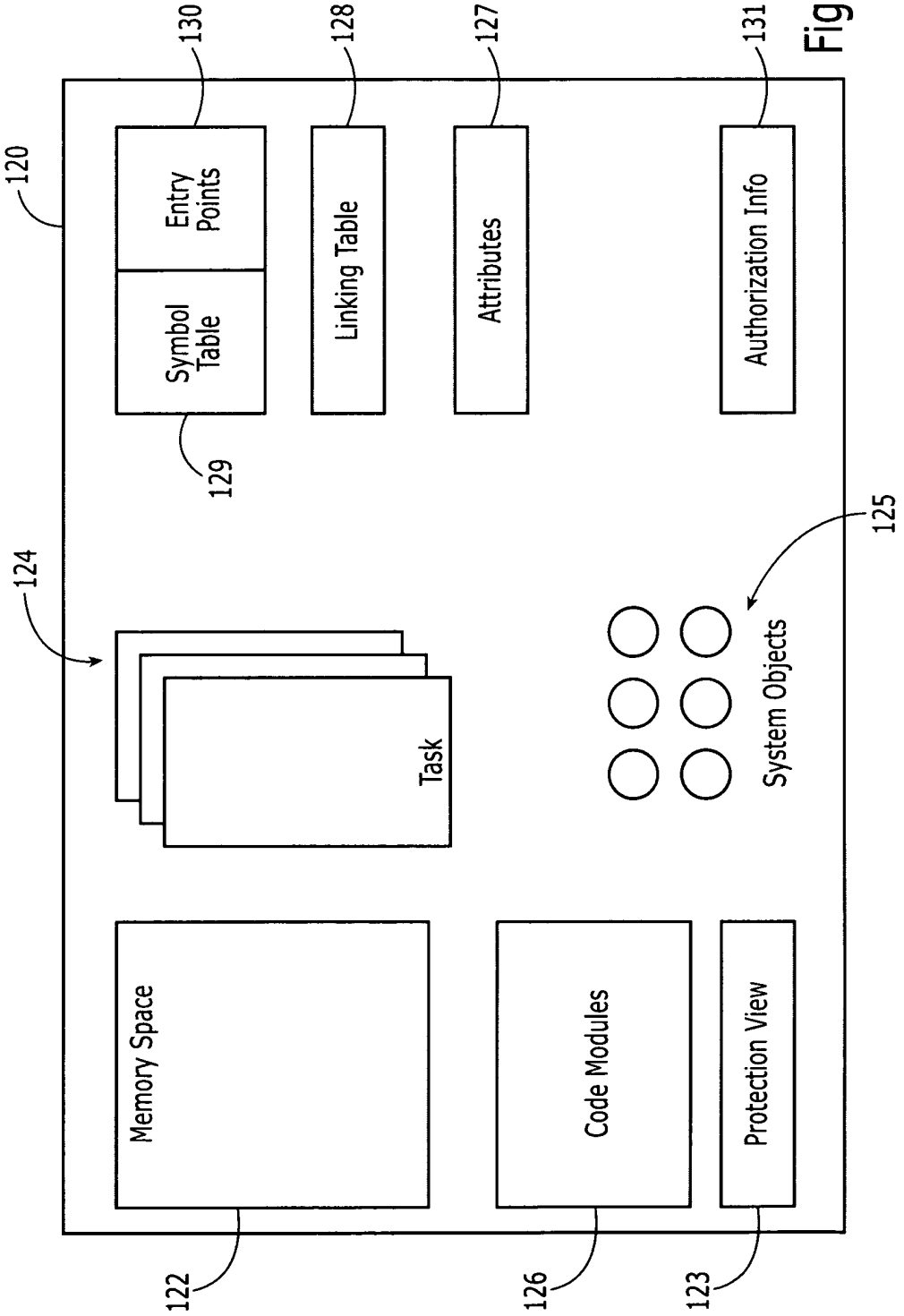

120
130
128
127
131
Entry Points
Symbol Table
129
Linking Table
Attributes
Authorization Info
124
125
Task
System Objects
Memory Space
Code Modules
Protection View
122
126
123

Figure 4

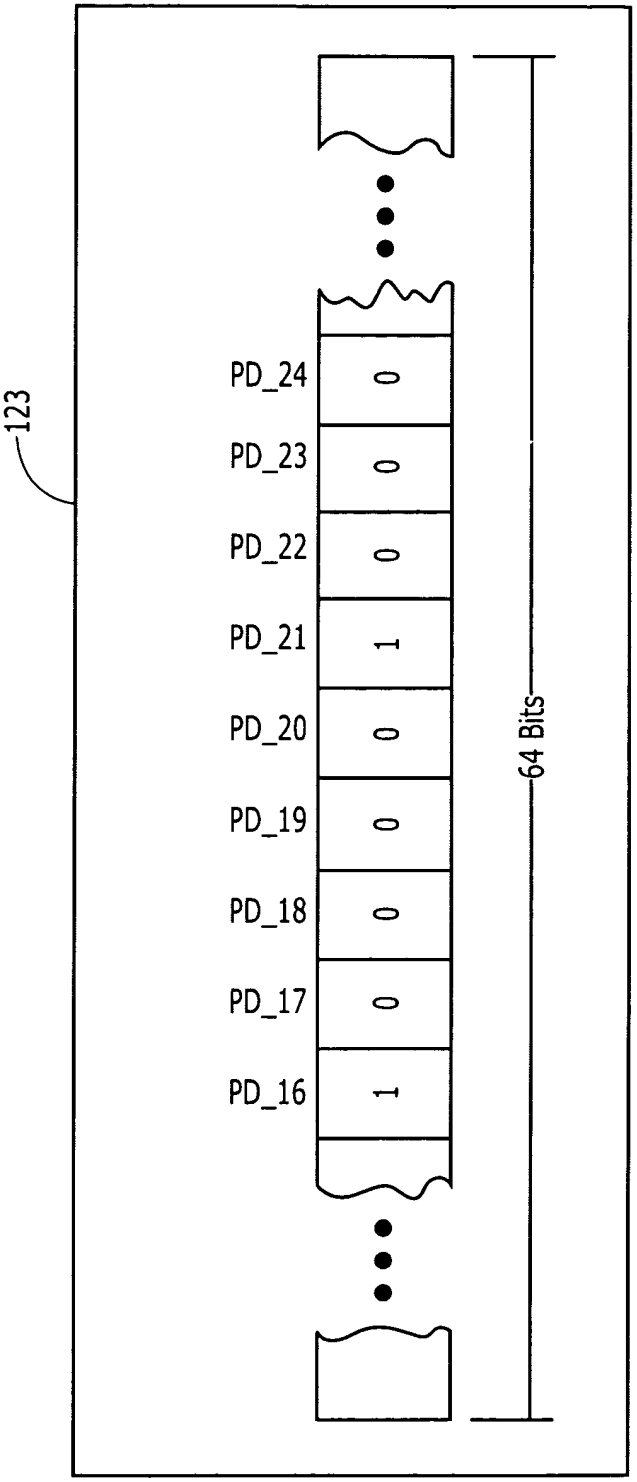

123
PD_24
PD_23
PD_22
PD_21
PD_20
PD_19
PD_18
PD_17
PD_16
0
0
0
1
0
0
0
0
1
64 Bits

Figure 5

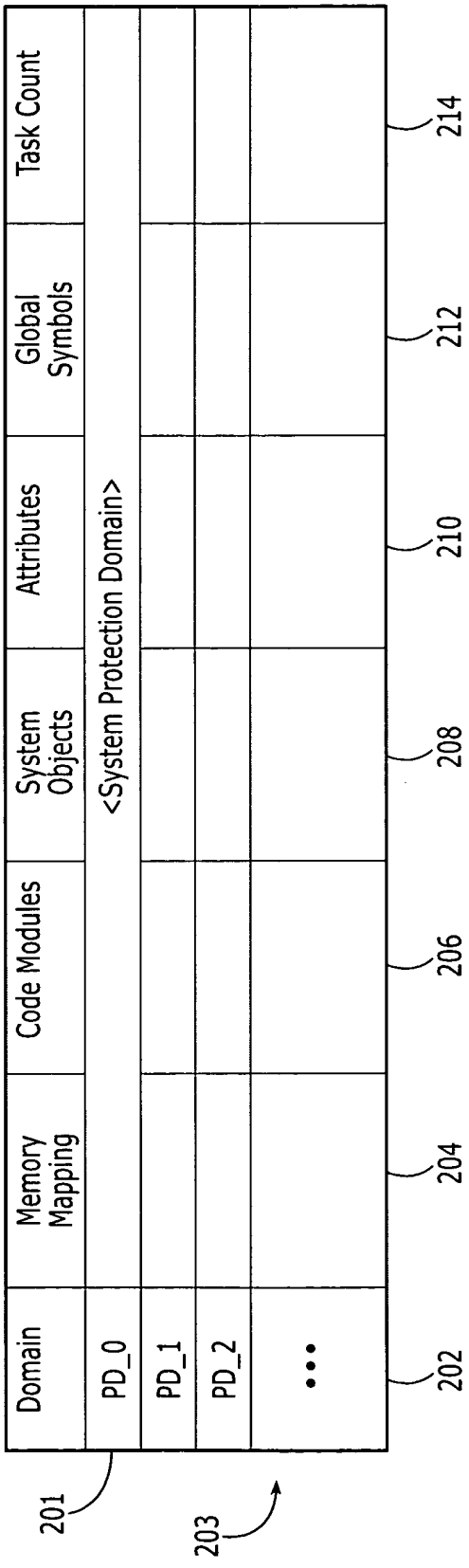

Domain
Memory Mapping
Code Modules
System Objects
Attributes
Global Symbols
Task Count
<System Protection Domain>
PD_0
PD_1
PD_2
...
201
202
203
204
206
208
210
212
214

Figure 6

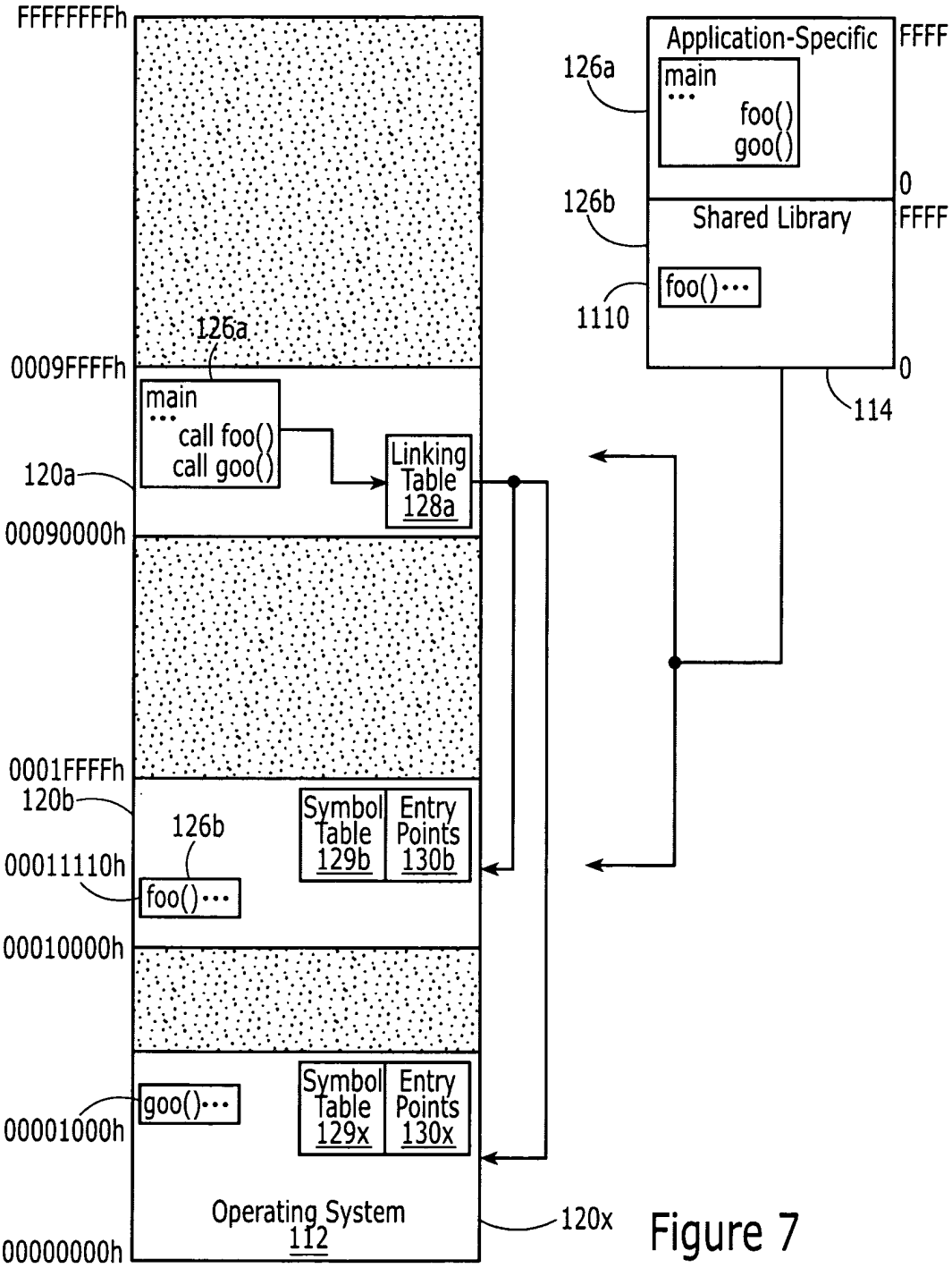

FFFFFFFFh
0009FFFFh
00090000h
0001FFFFh
00010000h
00001000h
00000000h
126a
main
call foo()
call goo()
120a
Linking Table 128a
120b
126b
foo()
00011110h
Symbol Table 129b
Entry Points 130b
goo()
Symbol Table 129x
Entry Points 130x
Operating System 112
120x
Application-Specific
FFFF
126a
main
foo()
goo()
0
126b
Shared Library
FFFF
foo()
1110
0
114

Figure 7

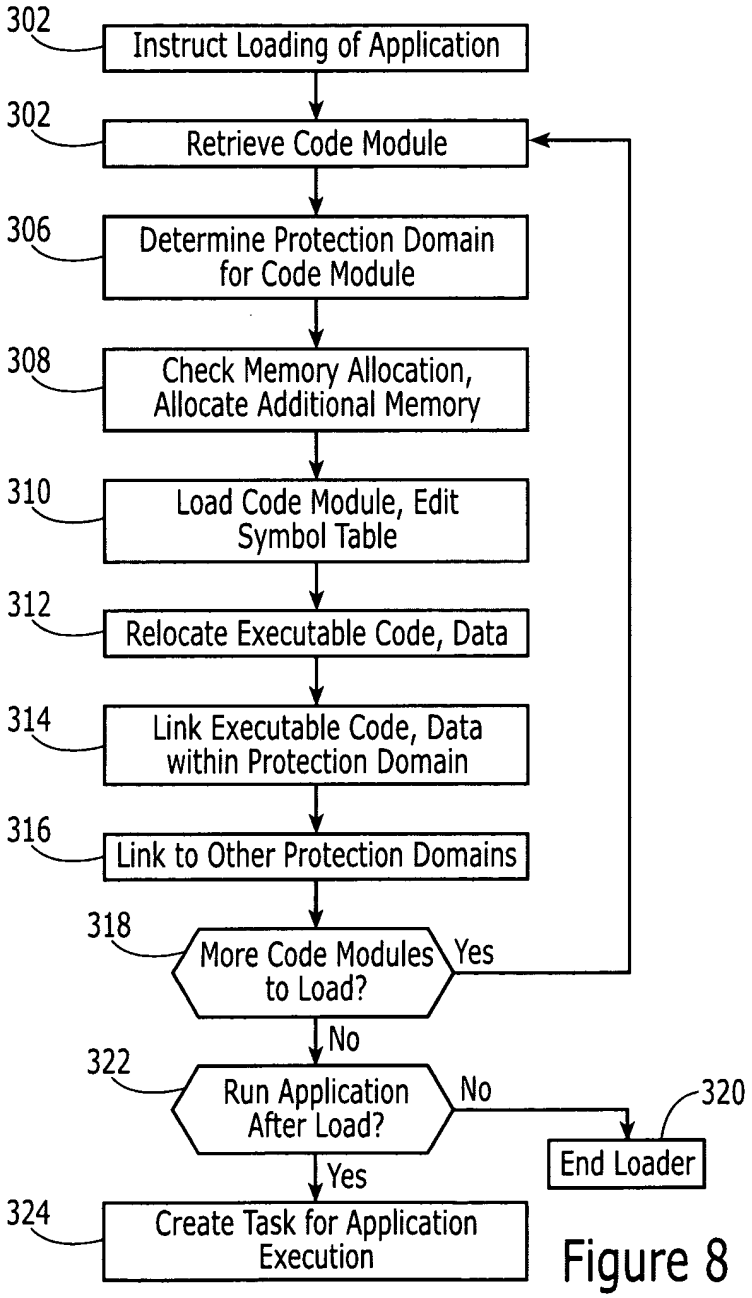

302
Instruct Loading of Application
302
Retrieve Code Module
306
Determine Protection Domain for Code Module
308
Check Memory Allocation, Allocate Additional Memory
310
Load Code Module, Edit Symbol Table
312
Relocate Executable Code, Data
314
Link Executable Code, Data within Protection Domain
316
Link to Other Protection Domains
318
More Code Modules to Load?
Yes
No
322
Run Application After Load?
No
320
End Loader
Yes
324
Create Task for Application Execution

Figure 8

129

Entry #	Symbol	Symbol Address	Entry Point?
0	<symbol_name_0>	<address_0>	<y/n>
1	<symbol_name_1>	<address_1>	<y/n>
2	<symbol_name_2>	<address_2>	<y/n>
3	<symbol_name_3>	<address_3>	<y/n>
4	<symbol_name_4>	<address_4>	<y/n>
•••	•••	•••	•••

Figure 9

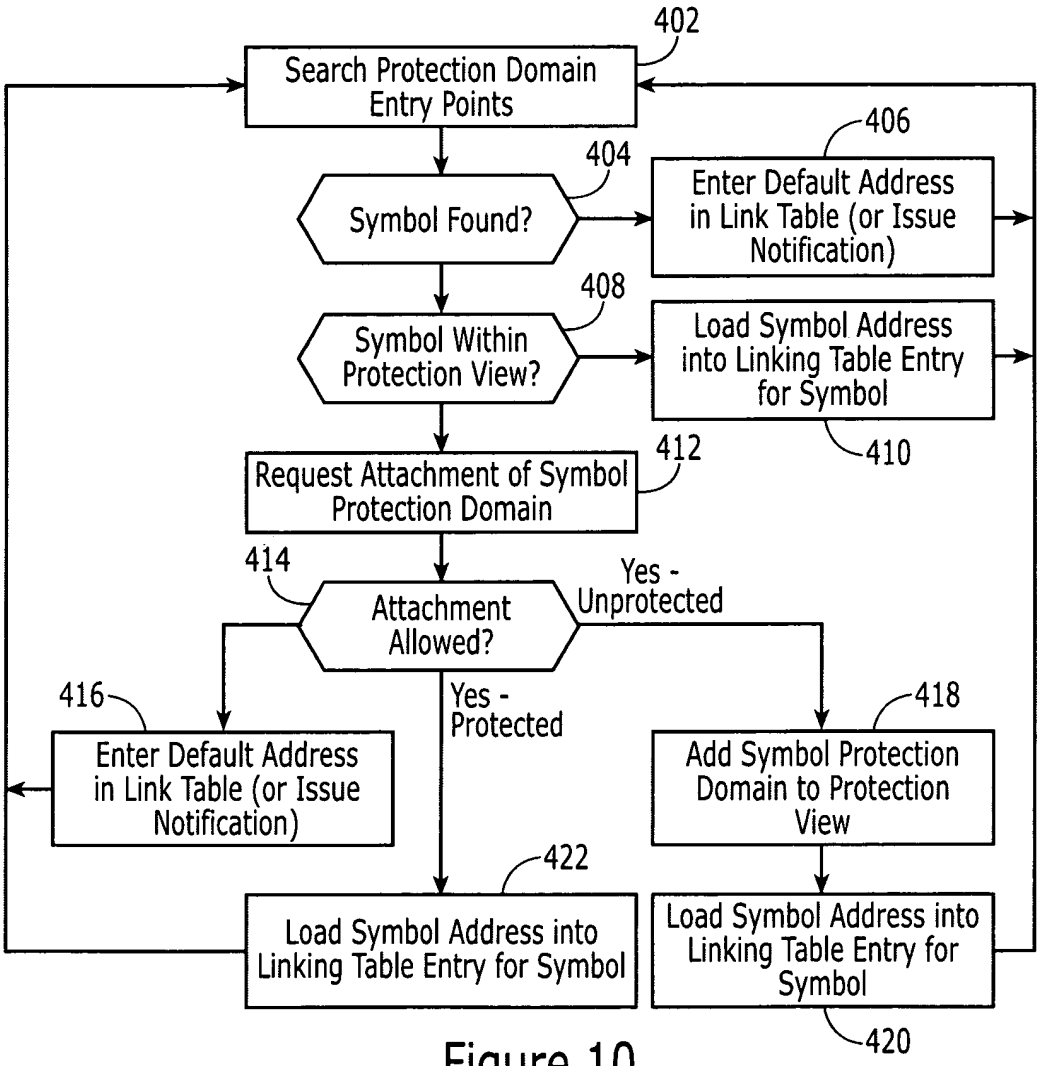
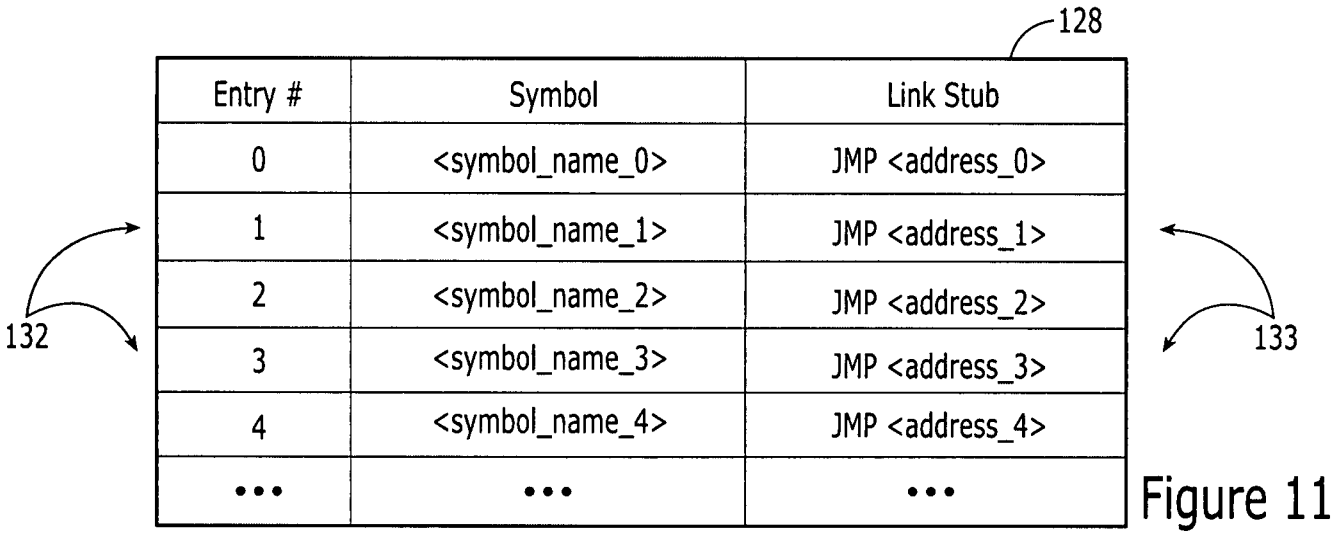
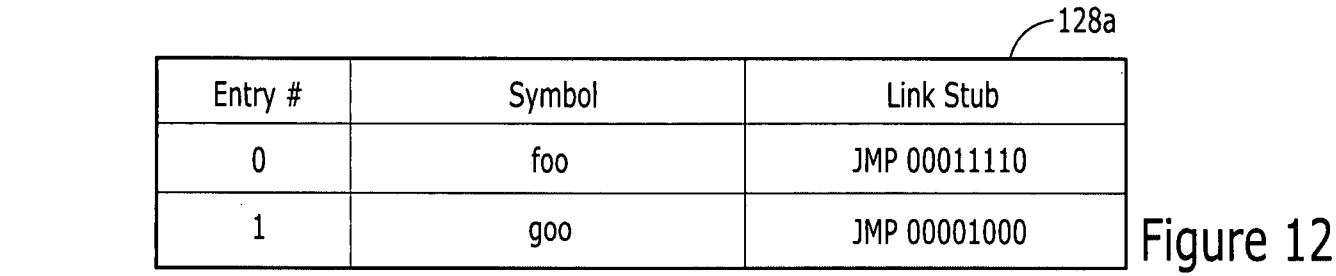

402
Search Protection Domain Entry Points
404
Symbol Found?
406
Enter Default Address in Link Table (or Issue Notification)
408
Symbol Within Protection View?
Load Symbol Address into Linking Table Entry for Symbol
410
412
Request Attachment of Symbol Protection Domain
414
Attachment Allowed?
Yes - Unprotected
Yes - Protected
416
Enter Default Address in Link Table (or Issue Notification)
418
Add Symbol Protection Domain to Protection View
422
Load Symbol Address into Linking Table Entry for Symbol
Load Symbol Address into Linking Table Entry for Symbol
420

Figure 10



Entry #	Symbol	Link Stub
0	<symbol_name_0>	JMP <address_0>
1	<symbol_name_1>	JMP <address_1>
2	<symbol_name_2>	JMP <address_2>
3	<symbol_name_3>	JMP <address_3>
4	<symbol_name_4>	JMP <address_4>
•••	•••	•••

Figure 11



Entry #	Symbol	Link Stub
0	foo	JMP 00011110
1	goo	JMP 00001000

Figure 12

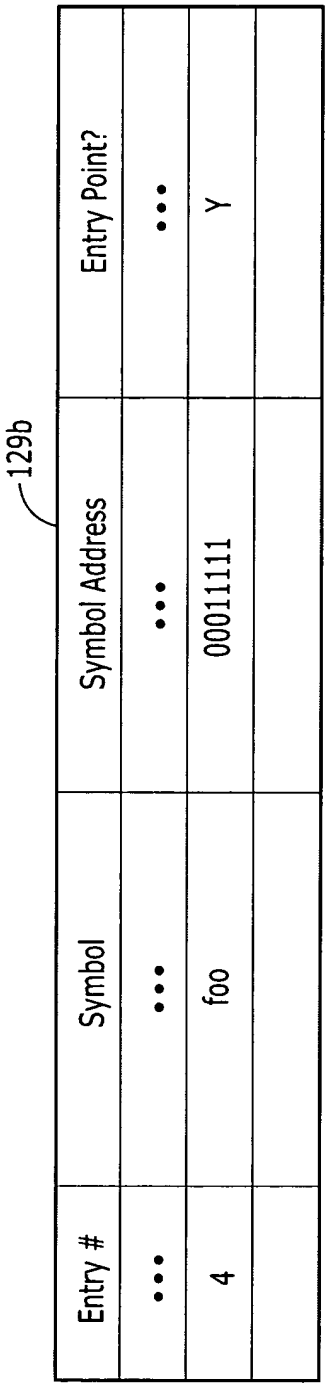


Figure 13

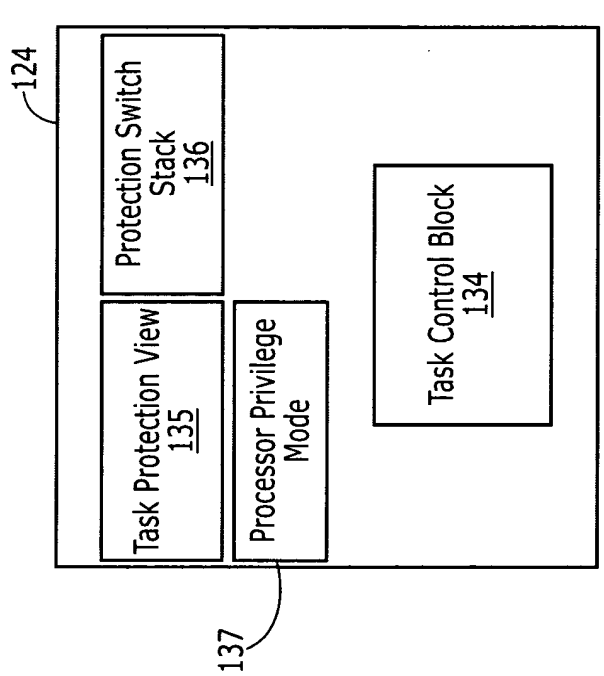


Figure 14

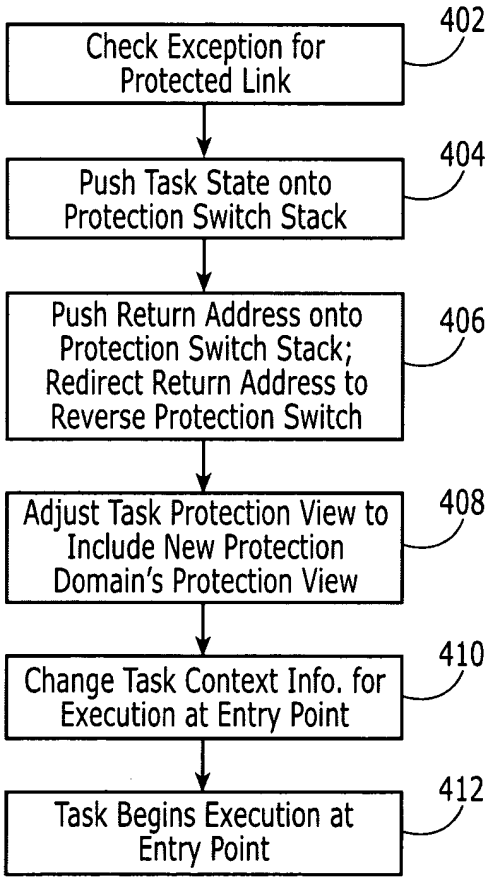

Check Exception for Protected Link
402
Push Task State onto Protection Switch Stack
404
Push Return Address onto Protection Switch Stack; Redirect Return Address to Reverse Protection Switch
406
Adjust Task Protection View to Include New Protection Domain's Protection View
408
Change Task Context Info. for Execution at Entry Point
410
Task Begins Execution at Entry Point
412

Figure 15

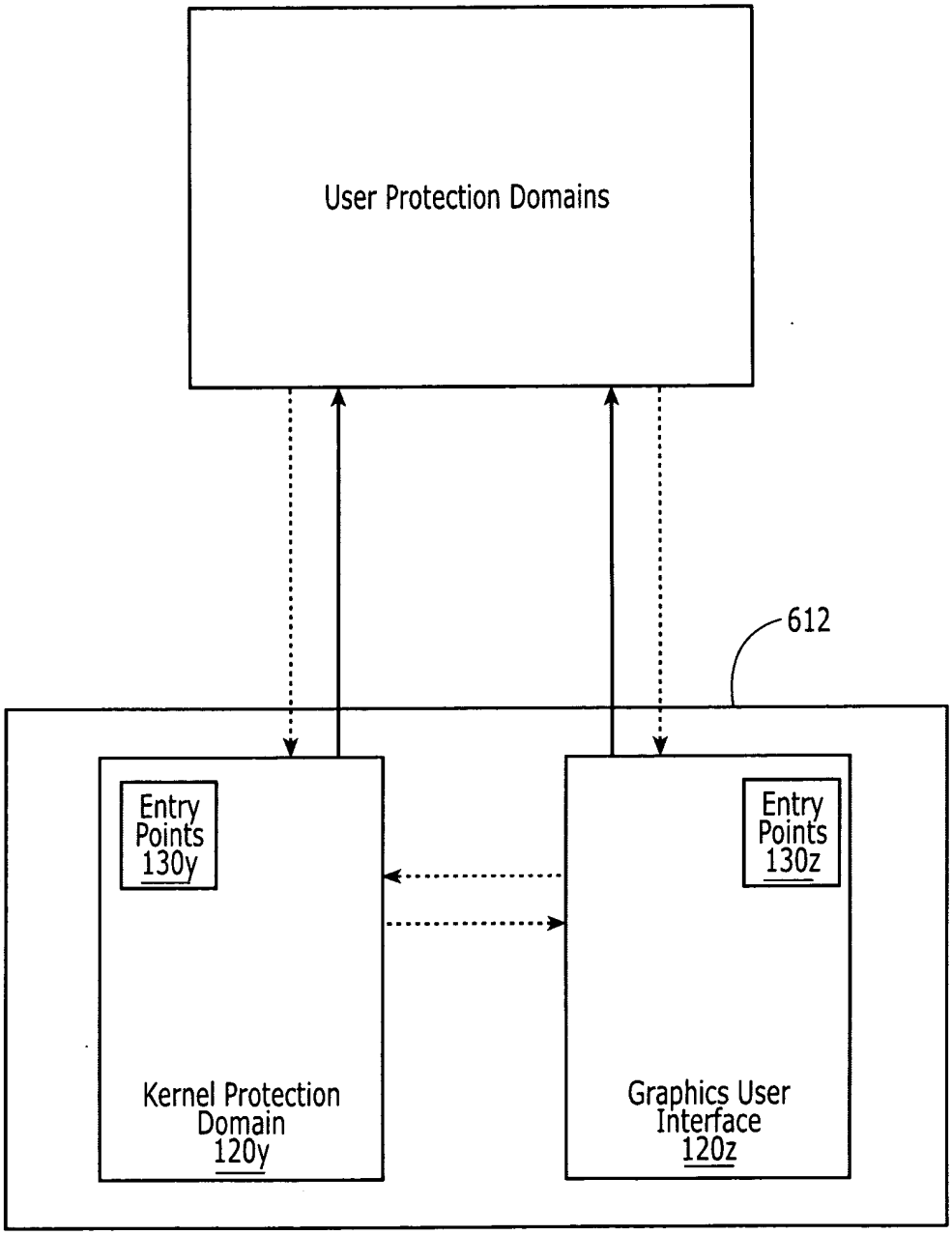

User Protection Domains
612
Entry Points 130y
Entry Points 130z
Kernel Protection Domain 120y
Graphics User Interface 120z

Figure 16

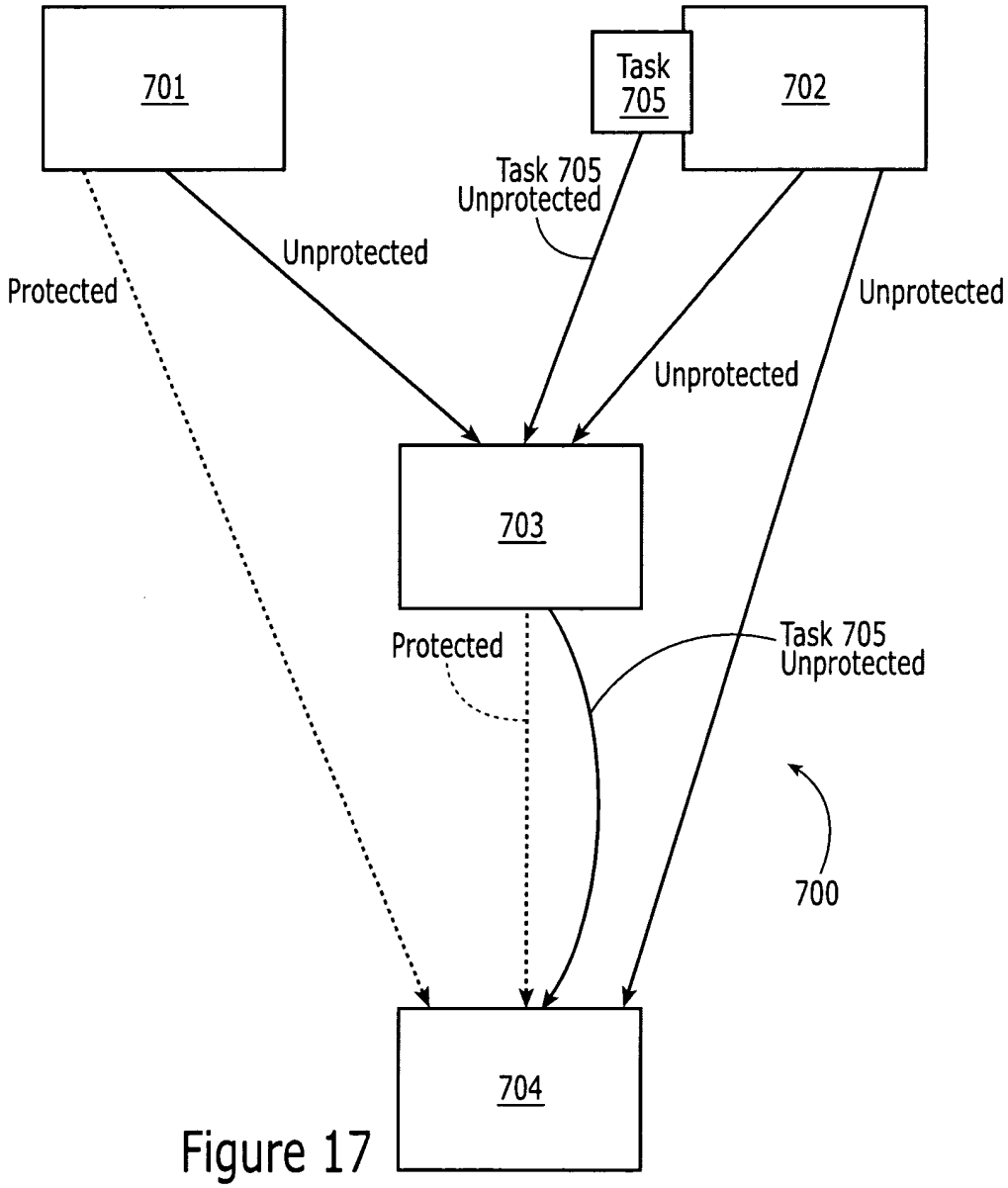

701
Task
705
702
Task 705
Unprotected
Unprotected
Protected
Unprotected
Unprotected
703
Protected
Task 705
Unprotected
700
704

Figure 17

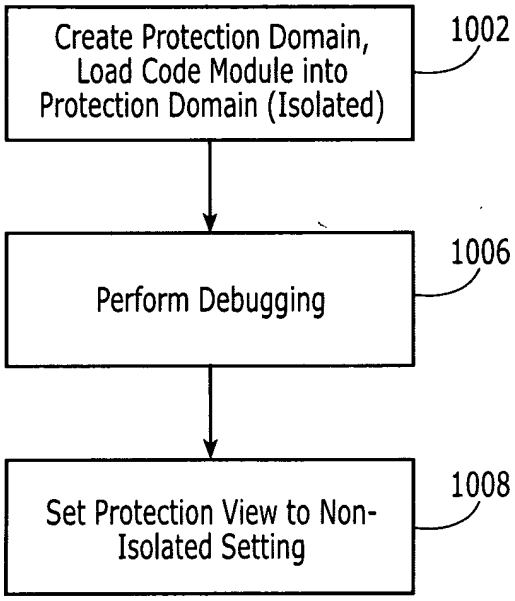

Create Protection Domain, Load Code Module into Protection Domain (Isolated)
1002
Perform Debugging
1006
Set Protection View to Non-Isolated Setting
1008

Figure 18